Space Weather Forecast

Issued on Thursday, 18 August 2022 at 00:10 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: G1/Minor storms expected Day 1 and likely on Day 2, with a chance of G2/Moderate storm, mainly Day 1. Further Moderate flares (R1-R2 Radio blackouts) likely throughout.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity is Moderate with two Moderate-class flares in the last 24 hours. This was from the relatively complex region in the southwest quadrant. There are five numbered sunspot regions and two small un-numbered on the visible disc at present. The region mentioned above is the largest and most active region and is displaying strong spots with magnetic complexity. The two other most notable spot regions are a bi-polar region in the northeast quadrant, and another bi-polar group now in the northwest quadrant. Although only isolated Common-class flares have been produced by these. Other regions are very small unremarkable.

A CME (Coronal Mass Ejection) associated with one or more flares in short-succession from the largest sunspot region on the 16th has been analysed and may give a glancing blow to Earth on the 19th, though the bulk of the ejecta appears to pass below Earth. Two low level Moderate flares from the active sunspot region in the southwest, and a filament lift off just to the west, on the UTC afternoon of the 17th produced a combination of two notable CMEs. These are modelled to mainly pass below Earth. However, there may still be some possible glancing influence from these later on 19th.

Solar Wind / Geomagnetic Activity: The solar wind increased gradually but rather erratically from 380 km/s to around 530 km/s. The Interplanetary Magnetic Field was weak to start, soon increasing to Moderate levels after 17/0200 UTC and continuing at these levels thereafter.. The north-south component varied weakly to begin with but became more erratic, then strengthened after 17/1600 UTC, with a period of moderate to briefly strong southward orientation. Parameters appear to indicate an enhancement around 17/0200 UTC, with a likely CME arrival around 17/1600 UTC. Resultant Geomagnetic activity was Quiet to Unsettled (Kp 1-3), before increasing G1-G2/Minor-Moderate Storm (Kp 5-6) between 17/1500-2400 UTC, as recorded by BGS. Lerwick observatory observed a G3/Strong Storm (K7) at 17/1800-2100 UTC.

Energetic Particles / Solar Radiation: No solar radiation storms were observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is likely to be Moderate with a slight chance of High levels. The most likely source region for any larger flares would be from the larger magnetically complex region in the southwest quadrant.

Solar Wind / Geomagnetic Activity: Solar winds are currently at elevated levels due to ongoing CME influence from the 14th and 15th August CME arrival, and probable high speed

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stream influence from coronal hole 14. The combined effect of one or more CMEs that left the sun on the 16th August may give a glancing blow at Earth either late on the 18th (Day 1) or early on 19th August (Day 2). Also, the CMEs observed on 17th may give some glancing influence later on 19th, perhaps into early 20th, although this is low confidence. Therefore, solar winds are expected to remain enhanced through much of the period with the HSS and also with the possibility of further CME influences through Day 2, perhaps into Day 3. Wind speeds should then begin to decline into Day 4 (21st Aug).

Corresponding geomagnetic activity is expected to be Active to G1/Minor Storm, with a chance of G2/Moderate Storms and a slight chance of isolated G3/Strong Storms at first on Day 1. A risk of further G1/Minor Storms carries through Day 2 (19th), perhaps into early Day 3 (20th), before reducing more confidently into Day 4 (21st).

Energetic Particles / Solar Radiation: Solar radiation storms are unlikely, but there is a slight chance of an S1 or greater event. This is mainly due to the more complex region which is now in the southwest quadrant of the Sun, where any proton events are more likely to reach Earth.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	Yes	80	50	20	5
Strong	G3	No	15	5	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	60	60	60	50
Very Active	R3 to R5 X	No	10	10	10	10

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	10	15	15	15
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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